

**CLAIM AMENDMENTS**

1-76. (canceled)

77. (currently amended): The membrane of claim 75 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons is in the range of 0.01-100  $\Omega \cdot \text{cm}^2$  at at least one temperature between 220°C and 550°C.

wherein the metal or metal in the metal hydride is selected from the group consisting of Pd, PdAg, PdCu, Ti, LaNi<sub>5</sub>, TiFe and CrV<sub>2</sub>, V/Ni/Ti, V/Ni and V/Ti.

78. (currently amended): The membrane of claim 75 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons is in the range of 0.01-100  $\Omega \cdot \text{cm}^2$  at at least one temperature between 220°C and 550°C.

wherein the electronically-insulating proton conductor coating is selected from the group consisting of:

mesoporous zirconium phosphate pyrophosphate, Zr(P<sub>2</sub>O<sub>7</sub>)<sub>0.81</sub>;

Ba<sub>3</sub>Ca<sub>1.18</sub>Nb<sub>1.82</sub>O<sub>8.73</sub>·H<sub>2</sub>O;

Cs<sub>5</sub>H<sub>3</sub>(SO<sub>4</sub>)<sub>4</sub>·0.5H<sub>2</sub>O;

a hydrate of SnCl<sub>2</sub>;

silver iodide tetratungstate Ag<sub>26</sub>I<sub>18</sub>W<sub>4</sub>O<sub>16</sub>;

KH<sub>2</sub>PO<sub>4</sub>;

tetraammonium dihydrogen triselenate, (NH<sub>4</sub>)<sub>4</sub>H<sub>2</sub>(SeO<sub>4</sub>)<sub>3</sub>;

CsDSO<sub>4</sub>;

CsH<sub>2</sub>PO<sub>4</sub>;

Sr[Zr<sub>0.9</sub>Y<sub>0.1</sub>]O<sub>3-δ</sub>;

a silica-polyphosphate composite containing ammonium ions;

La<sub>0.9</sub>Sr<sub>0.1</sub>Sc<sub>0.9</sub>Mg<sub>0.1</sub>O<sub>3</sub>; and

BaCe<sub>0.9-x</sub>Zr<sub>x</sub>M<sub>0.1</sub>O<sub>3-δ</sub> where M is Gd or Nd and x = 0 to 0.4.

79. (currently amended): The membrane of claim 75 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of

a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons is in the range of 0.01-100 Ω.cm<sup>2</sup> at at least one temperature between 220°C and 550°C,

wherein the electronically-insulating proton-conducting coating consists of

Ba<sub>3</sub>Ca<sub>1.18</sub>Nb<sub>1.82</sub>O<sub>8.73</sub>·H<sub>2</sub>O;

CsH<sub>2</sub>PO<sub>4</sub>;

Sr[Zr<sub>0.9</sub>Y<sub>0.1</sub>]O<sub>3-δ</sub>;

polyphosphate composite containing 19.96 wt% NH<sub>4</sub><sup>+</sup>, 29.3 wt% P, 1.51 wt% Si;

La<sub>0.9</sub>Sr<sub>0.1</sub>Sc<sub>0.9</sub>Mg<sub>0.1</sub>O<sub>3</sub>; or

BaCe<sub>0.9-x</sub>Zr<sub>x</sub>M<sub>0.1</sub>O<sub>3-δ</sub> where M is Gd or Nd and x = 0 to 0.4.

80-81. (canceled)

82. (currently amended): The membrane of claim 75 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of

a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase,

said coating having a thickness such that wherein the area-specific resistance for protons at at least one temperature between 220°C and 550°C is about 0.150  $\Omega \cdot \text{cm}^2$ .

83-85. (canceled)

86. (currently amended): The membrane of claim 85, A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the ASR for protons at at least one temperature between 220°C and 550°C is in the range shown for Nafion® 117 in Figure 10:

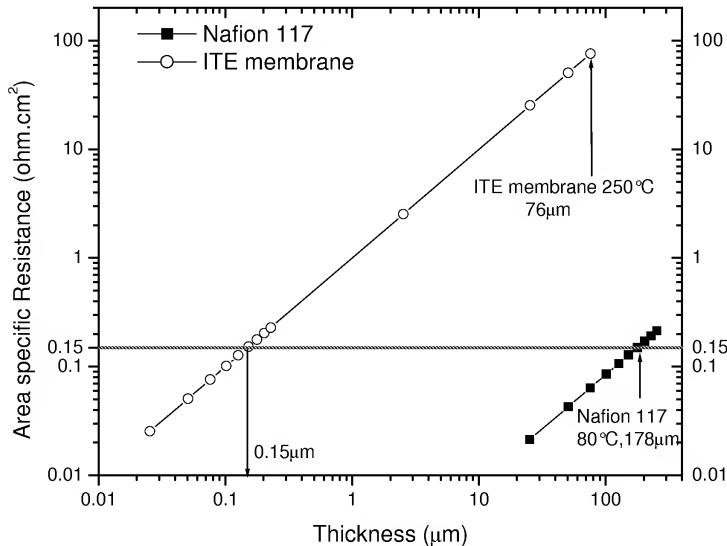


Figure 10:

wherein the metal or metal in the metal hydride is selected from the group consisting of Pd, PdAg, PdCu, Ti, LaNi<sub>5</sub>, TiFe and CrV<sub>2</sub>, V/Ni/Ti, V/Ni and V/Ti.

87. (currently amended): The membrane of claim 84 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the ASR for protons at at least one temperature between 220°C and 550°C is in the range shown for Nafion® 117 in Figure 10:

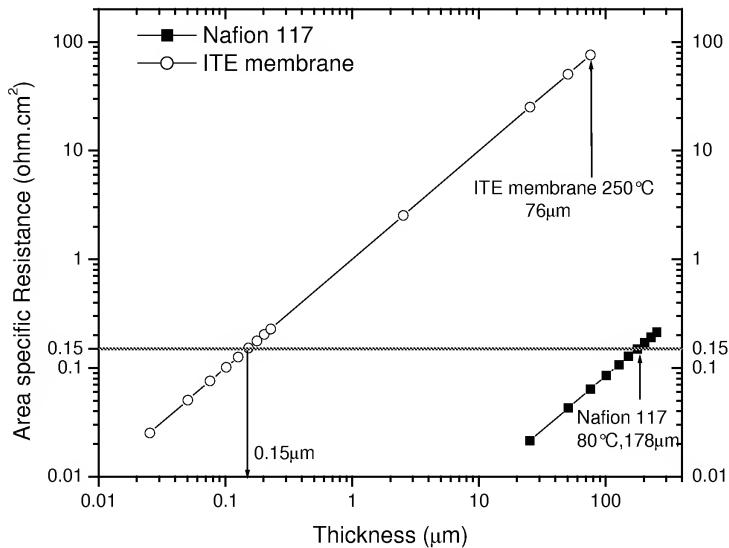


Figure 10:

wherein the electronically-insulating proton-conducting coating is selected from the group consisting of:

mesoporous zirconium phosphate pyrophosphate,  $Zr(P_2O_7)_{0.81}$ ;  
 $Ba_3Ca_{1.18}Nb_{1.82}O_{8.73}\cdot H_2O$ ;  
 $Cs_5H_3(SO_4)_4\cdot 0.5H_2O$ ;  
a hydrate of  $SnCl_2$ ;  
silver iodide tetratungstate  $Ag_{26}I_{18}W_4O_{16}$ ;  
 $KH_2PO_4$ ;  
tetraammonium dihydrogen triselenate,  $(NH_4)_4H_2(SeO_4)_3$ ;  
 $CsDSO_4$ ;  
 $CsH_2PO_4$ ;  
 $Sr[Zr_{0.9}Y_{0.1}]O_{3-\delta}$ ;  
a silica-polyphosphate composite containing ammonium ions;  
 $La_{0.9}Sr_{0.1}Sc_{0.9}Mg_{0.1}O_3$ ; and  
 $BaCe_{0.9-x}Zr_xM_{0.1}O_{3-\delta}$  where M is Gd or Nd and x = 0 to 0.4.

88. (currently amended): The membrane of claim 84, A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the ASR for protons at at least one temperature between 220°C and 550°C is in the range shown for Nafion® 117 in Figure 10:

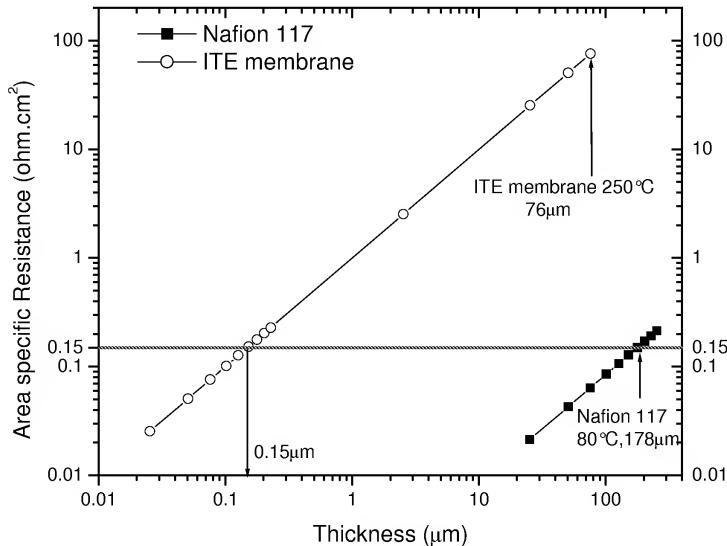


Figure 10:

wherein the electronically-insulating proton-conducting coating consists of  
 $\text{Ba}_3\text{Ca}_{1.18}\text{Nb}_{1.82}\text{O}_{8.73}\text{-H}_2\text{O}$ ;  
 $\text{CsH}_2\text{PO}_4$ ;  
 $\text{Sr}[\text{Zr}_{0.9}\text{Y}_{0.1}]\text{O}_{3-\delta}$ ;

polyphosphate composite containing 19.96 wt%  $\text{NH}_4^+$ , 29.3 wt% P, 1.51 wt% Si;

$\text{La}_{0.9}\text{Sr}_{0.1}\text{Sc}_{0.9}\text{Mg}_{0.1}\text{O}_3$ ; or

$\text{BaCe}_{0.9-x}\text{Zr}_x\text{M}_{0.1}\text{O}_{3-\delta}$  where M is Gd or Nd and x = 0 to 0.4.

89-90. (canceled)

91. (currently amended): The membrane of claim 84 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons at at least one temperature between 220°C and 550°C is about 0.150  $\Omega \cdot \text{cm}^2$  as shown for Nafion® 117 in  
Figure 10:

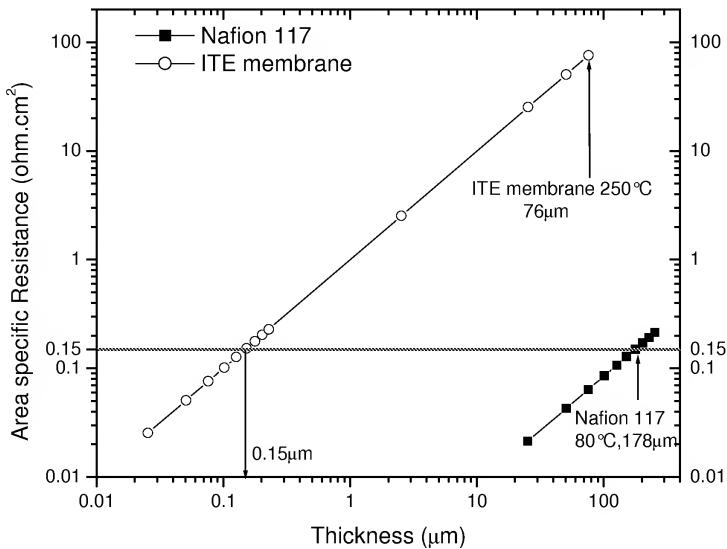


Figure 10.

wherein the area-specific resistance for protons at at least one temperature between 220°C and 550°C is about 0.150  $\Omega \cdot \text{cm}^2$ .